

US EPA ARCHIVE DOCUMENT

Freshwater Net Environmental Benefit Analysis Exercises



US EPA Region V

NEBA Concept

- Environmental issues are often too complex to work through in the time-frame of an emergency
 - Environmental issues can be evaluated if there is time available for analysis
 - Understanding of environmental issues enables response decisionmakers to incorporate environmental concerns
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- NEBA: Engage “both sides” – natural resource scientists/managers and response coordinators

NEBA Concept

Resource and response management tool designed to improve the quality and results of environmental decision making by

- Considering possible response actions
- Evaluating potential environmental impacts
- Comparing and contrasting trade-offs
- Ranking risks in order to prioritize courses of action and/or outcomes

Additional angle from the originators: Public relations - [Assembled expertise] trying to counter "myth and innuendo"

NEBA Origins

- Pioneered in 1998 – Regional Response Team, Region 9
- “Consensus Analysis Process” emerged from the San Francisco Bay Ecological Risk Assessment – could the RRT replicate this for “daily use”?
- Originally oriented toward coastal marine environments – California coast, San Francisco Bay
- Adapted to a freshwater setting by EPA Region 5 beginning with Mississippi River and Isle Royale (Lake Superior)

NEBA Practicalities

- If consensus is wanted during a response, it needs to be developed beforehand
- Lack of consensus stems from
 - Differences in ecological reference frameworks
 - Status and/or handling of information
 - Missing scientific information
 - Misleading/inconsistent information
 - Inadequate communication or information dissemination
- To paraphrase Bill Robberson, EPA Region 9, the lack of consensus seems to be an outgrowth of the ways we manage resources

NEBA Practicalities

Process needs:

- Open, honest communication
- Education about realities of natural resources management
- Education about spill response expectations and realities
- Science
- Empathy
- Decisionmaking

NEBA Process – Considerations

Practical issues:

- Small group (20-40 people), not a conference
 - Good breadth of knowledge, but few enough participants that people can talk with each other, have some breathing room
- At or near site of interest
 - Local experts implies limited budgets. Getting them involved means going to them
- “Neutral” facilitator
 - Can be an agency like EPA, can be an interested 3rd party. Best if not a heavily invested local resource person or a responder representative

NW Indiana NEBA Participants

Kenneth Brockhouse – USCG MSO Chicago

Kiley Ross – USCG MSO Chicago

Todd Webb, Property Manager – Indiana Dunes State Park

Charles Webster – Indiana Dunes National Lakeshore

David Cage, On-Scene Coordinator – Indiana Dept. of Environmental Management

Derek Nimetz – Indiana DNR, Div. of Nature Preserves

Steve Newhouse, Biological Coordination Section – Indiana Dept. of Environmental Management

Dave Anderson – NPS Damage Assessment Program

Chris Christenson – US EPA Region V

Michelle Jaster, On-Scene Coordinator – US EPA Region V

David Fritz – BP

Dave Siebold – Marathon-Ashland

Vicki May – Marathon-Ashland

Young Choi – Purdue University-Calumet

NW Indiana NEBA Participants

Who's missing?

- US Fish and Wildlife Service?
- Other regulatory agencies?
- Local government?
- Property owners' representative?

What does this imply?

- Process needs a better sales angle
 - Clear applicability
 - Integration into a broader scheme

NW Indiana NEBA Participants

Why these categories of groups?

- Local
 - Natural resource knowledge from the field
 - Active interest in the site
 - Participants in existing response resources
 - Knowledge of potential response resources
 - Most likely source of impetus for change
- Regional/National
 - Steeped in the regulations/requirements
 - Can channel resources for implementation
 - Need opportunities to connect to locals

NW Indiana NEBA - Process

Background and significance of effort

- History
- Perspective
 - a locally focused effort, not a universally focused one
- Interaction, communication
 - who's sitting around the table, what do they do, why are they here and why are they interested?
- Commitment, obligation
 - no federal regulations require this, but it may improve how some regulations are met

NW Indiana NEBA - Process

Oil spill realities

- Once oil is spilled, there will be injury to the environment
- No amount of cleanup will remove all the oil from the environment
- Fate and transport overview
- Short-term vs. long-term impacts

Goals of oil spill response

- Protect human life
- Prevent additional or continuing loss of oil
- Prevent or mitigate environmental damage

NW Indiana NEBA - Process

Introduce the local setting

- Indiana Dunes National Lakeshore, Indiana Dunes State Park
- Exceptional biological diversity
- Beaches, wetlands, dunes, prairie
- National Natural Landmarks, National Historic Landmarks

(Resource information, presented as background for the responders)

NW Indiana NEBA - Process

Introduce response strategies

- Manual removal
- Mechanical removal
- In-situ burning
- Do nothing

(Technical background for the resource managers)

NW Indiana NEBA - Process

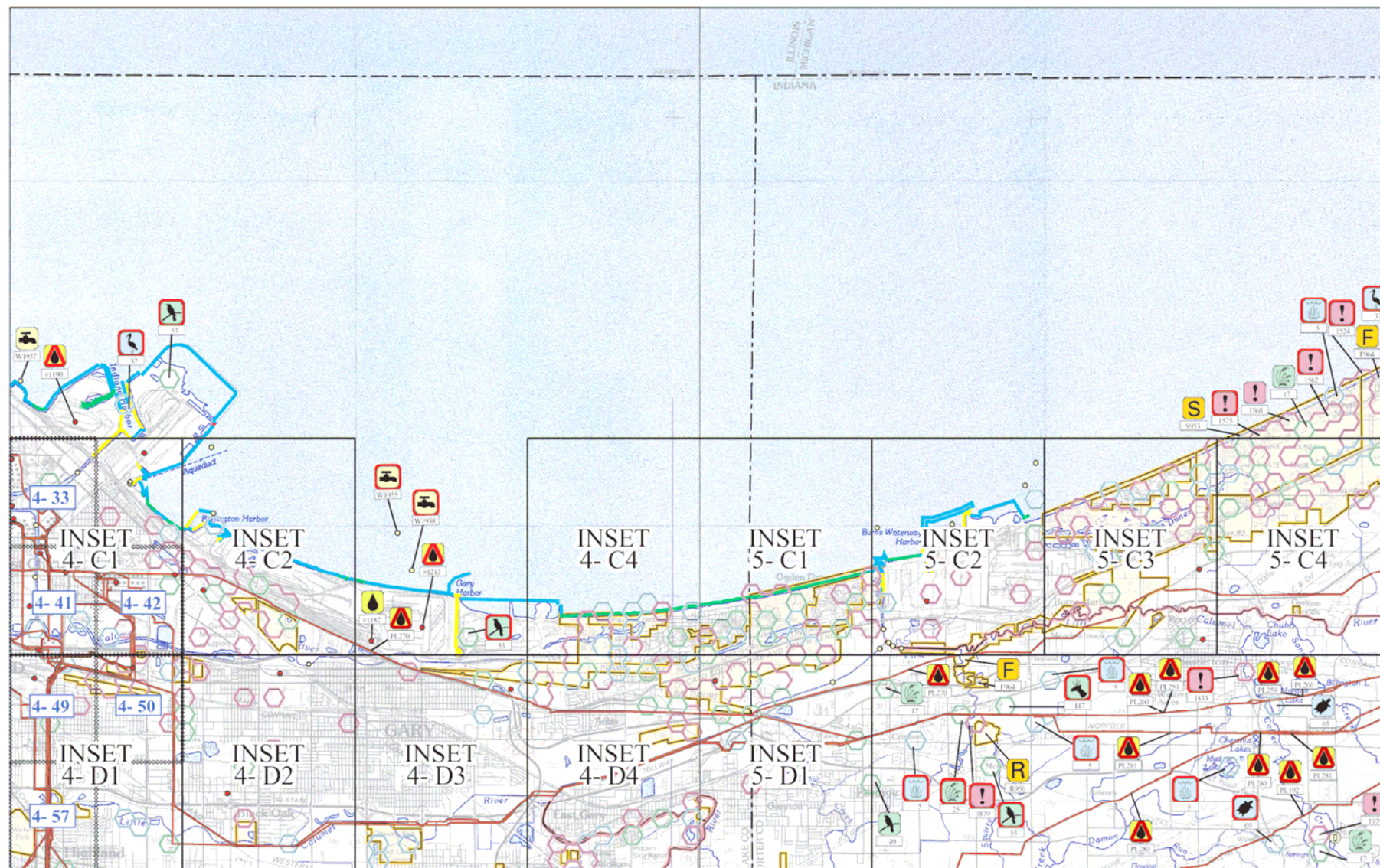
Many levels of detail and interaction –

- Resource assessment
- Location, extent or prime use areas for each resource
- Characteristic or key species for each resource type
- Seasonal or life history information for important species
- 'Effects data', e.g., toxicity/physical effects of the stressors on the resources of concern
- Specific geographic areas of concern
- Population vs. Community Dynamics
- Density Dependence
 - Keystone Species
- Time and Spatial Scaling
 - Uncertainty and Variability
- Definition of System Boundaries
 - Cumulative Effects
- Complex Linkages
 - Basis of value for resource
- Resources potentially affected by one stressor but not another

NW Indiana NEBA - Process

Scenario

- Predefined, modeled if possible (animations are always well received...)
- Provides a focal point for discussion
- Makes the possibility more “real”
- This time:
 - 50,000 gallons of Arabian medium crude
 - Released into Indiana Harbor Canal, flows out into Lake Michigan
 - Westerly winds carry product to National Lakeshore



NW Indiana NEBA - Process

Oil Name = ARABIAN MEDIUM CRUDE

API = 29.5

Pour Point = 14 deg F

Wind Speed = constant at 10 mph

Wave Height = computed from winds

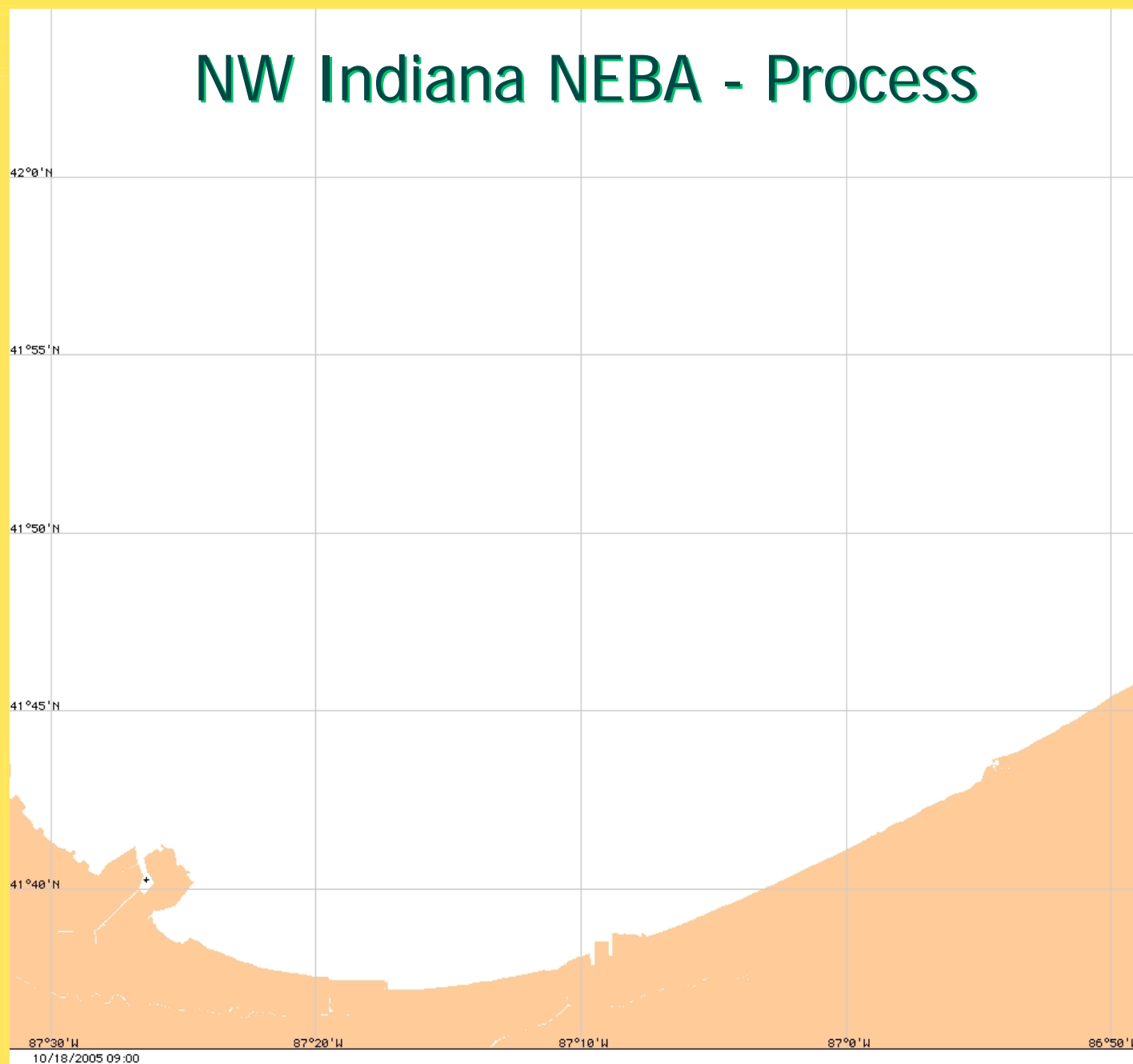
Water Temperature = 55 deg F

Time of Initial Release = October 18, 0900 hours

Total Amount of Oil Released = 50,000 gal

Hours into spill	Released gal.	Evaporated percent	Dispersed percent	Remaining percent
1	50,000	6	0	94
2	50,000	11	0	89
4	50,000	16	1	83
6	50,000	19	1	80
8	50,000	21	1	78
...				
114	50,000	29	2	70
120	50,000	29	2	69

NW Indiana NEBA - Process



NW Indiana NEBA - Process

Relative Risk Matrix

- Ecosystem categories
 - Beach
 - Industrial
 - River/canal
- Ecosystem zones
 - Terrestrial
 - Shoreline
 - Open water
 - Coastal wetland
 - Nearshore
 - Water quality

NW Indiana NEBA - Process

Relative Risk Matrix (cont.)

- Resource categories
 - Vegetation - Mammals
 - Birds, migratory and resident
 - Herptiles - Fish
 - Macroinvertebrates
 - Microinvertebrates
- Recovery options
 - Natural recovery
 - Manual/mechanical removal
 - In-situ burning

NW Indiana NEBA - Process

Relative Risk Matrix (cont.)

- Species stressors
 - Air Pollution (evaporating oil and in-situ burning)
 - Aqueous Exposure (inhalation or ingestion of whole oil droplets or dissolved components of the oil in the water column)
 - Physical Trauma (mechanical impact from equipment, boats, etc)
 - Physical Oiling/Smothering (due to direct contact)
 - Thermal (heat exposure from ISB)
 - Waste (exposure due to contact with waste generated by oil spill)
 - Indirect (food web, ingestion of contaminated food, etc.)

Species Stressor Matrix

Ecosystem Type	Terrestrial	Recovery Category		Coastal Wetlands	Recovery Category		Shoreline	Recovery Category	
		NR	MR		NR	MR		NR	MR
Species Grouping	Vegetation			Vegetation			Vegetation		
	Mammals			Mammals			Mammals		
	Birds			Birds			Birds		
	Herptiles			Herptiles			Herptiles		
	Macroinvertebrates			Fish			Macroinvertebrates		
				Macroinvertebrates			Microinvertebrates		
				Microinvertebrates					

Ecosystem Type	Nearshore	Recovery Category		Reefs	Recovery Category		Open Water	Recovery Category	
		NR	MR		NR	MR		NR	MR
Species Grouping	Vegetation			Vegetation			Vegetation		
	Mammals			Birds			Birds		
	Birds			Fish			Fish		
	Herptiles			Macroinvertebrates			Macroinvertebrates		
	Fish			Microinvertebrates			Microinvertebrates		
	Macroinvertebrates								
	Microinvertebrates								

Stressor Key:

1. Air Pollution
2. Aqueous Exposure
3. Physical Trauma
4. Physical Oiling
5. Thermal
6. Waste
7. Indirect (food web, etc.)

Recovery Categories: **NR** – Natural Recovery
MR – Mechanical Recovery

Ecosystems:

Terrestrial – Inland habitat beyond the high water mark and/or splash zone.
Coastal Wetlands – Emergent vegetation and wetland habitat hydrodynamically linked to Mississippi River waters.
Shoreline – From the normal waterline to the limit of the high water mark/splash zone.
Nearshore – Shallow waters (approximately 4–10 feet in depth) from the limit of emergent vegetation line outward.
Reef – Submerged aquatic structures supporting specific plant and animal life beyond the nearshore.
Open Water – Beyond the limit of the near shore and not including reef structures.

NW Indiana NEBA - Process

Relative Risk Matrix (cont.)

- "Risk ranking key"

		RECOVERY			
		> 7 years (SLOW) (1)	3 to 7 years (2)	1 to 3 years (3)	< 1 year (RAPID) (4)
% of RESOURCE	> 60% (LARGE) (A)	1A	2A	3A	4A
	40 to 60% (B)	1B	2B	3B	4B
	20 to 40% (C)	1C	2C	3C	4C
	5 to 20% (D)	1D	2D	3D	4D
	0 to 5% (SMALL) (E)	1E	2E	3E	4E

Figure 2. The proposed Risk Square.

NW Indiana NEBA - Process

Risk Ranking Matrix - Levels of Concern Indiana Dunes National Lakeshore March 29-30, 2005

		Potential Length of Recovery			
		Probable Population Collapse	Long-term (4-7 years)	Intermediate- term (2-3 years)	Short-term (1 year)
Degree of Resource Impact	Catastrophic	1A	2A	3A	4A
	Critical	1B	2B	3B	4B
	Marginal		2C	3C	4C
	Negligible		2D	3D	4D

Dark gray cells represent a **high** level of concern.

Light gray cells represent a **moderate** level of concern.

Unshaded cells represent a **limited** level of concern.

NW Indiana NEBA - Process

Relative Risk Matrix Results

- Each “resource category” includes one or more key species – especially vulnerable and/or especially valuable
- Discuss and rank everything for natural recovery first
- Discussion during the ranking process – record notes on impact types, sensitivities, relative significance, etc.
- The discussion that starts here is the foundation for whatever consensus develops by the time the exercise is completed

NW Indiana NEBA - Process

Relative Risk Matrix Results (cont.)

- Discuss and rank species resources for mechanical recovery
- Response options change by habitat. Note suggestions, questions, unresolved issues.

Final Result

- Species risks prioritized by response
- Basis for development of detailed local response plans
- Shared insights and new communication channels for key response planning groups

NW Indiana NEBA – Process Issues

- Limitations caused by the scenario approach
 - Restricts dialogue
 - Can intimidate or frustrate resource managers
- Breadth of impact factors
 - Seasons
 - Variety of species present
 - Species calendars (spawning, migration, etc.)
 - Spill sources
- Lack of follow-up
 - No tools
 - No strategies
 - No support

NEBA – Planned Changes

- Limited use of scenarios
- Standard species and habitat overviews
 - Site-specific species info still desirable
- Standard response technique overviews
- Incorporate healthy species into the equation
- Strategy and/or support for next steps (minimum); Better = meeting structure and product designed for follow-up

NEBA – Planned Changes

- Integration with other efforts
 - Contingency Plan
 - Advanced planning

